

PROCESS OF POLISHING WAFER

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Abstract

PURPOSE:To enable to detect polishing amount of each wafer even in the process of polishing operation by a method wherein, when multiple wafers are stucked on a pressurizing plate to polish one side of a wafer, a hole is pierced through the thickness direction of the pressurizing plate undersurface of which is blocked by a wafer for detecting work already performed to detect the amount of reflected rays from the wafer for detection by means of irradiating the hole with laser beams.

CONSTITUTION:Multiple silicon wafers 7 are stucked on the undersurface of pressurizing plate 1 with a pierced hole 2 at the central part thereof and the undersurface of the pierced hole 2 is blocked by a wafer 3 for detecting work already performed. A polishing cloth 8 with the same thickness as that of the polished work done and multiple crystal silicon with different reflecting power are stucked on the surface such as glass passing He-Ne laser beams on the wafer 3. In such a constitution, laser beams 5 from a laser beam generator 4 are irradiated on the wafer 3 through the holes 2 to polish wafers 7 while the reflected rays are being detected by a light quantity meter such as a solar cell. Through these procedures, the wafer 3 is extinguished and the finishing of the polishing operation is judged when the plishing cloth 8 is left alone.

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Title of the Invention

WAFER POLISHING METHOD

Scope of Patent Claims

(1) In a one-side polishing method for polishing one side of a wafer with a wafer attached to a pressure plate, a wafer polishing method, characterized by attaching a wafer for detecting a process amount of a wafer to a wafer attachment surface of a pressure plate provided with a through-hole in its thickness direction so as to shield said through-hole; irradiating a laser beam onto said wafer for detecting through the through-hole provided in the pressure plate; and controlling a polishing process amount while measuring a reflection from said wafer for detecting with a light amount meter such as a solar cell.

(2) The wafer polishing method of claim 1, characterized in that said wafer for detecting a process amount includes a material different in refractive index from a polishing cloth of the same amount as a desired wafer process amount attached to a surface of a transparent material relative to the wavelength of said laser beam.

Detailed Description of the Invention

The present invention relates to a wafer polishing method capable of automatically determining whether a desired polishing process amount has been removed.

When use was made of a conventional one-side polishing method, the polishing process amount was inferred from a polishing time assuming a constant polishing rate; however, since the polishing rate differs depending on the kind of polishing cloth, pressure force and the concentration or kind of a polishing solution, the polishing amount fluctuates so that, in order to carry out the removal of a few μm by polishing, it is necessary to measure the thickness of the wafer each time after polishing for a few minutes and thus it is extremely cumbersome and inaccurate.

The present invention has obviated this drawback and allows to automatically determine whether a predetermined polishing amount has been polished by providing a through-hole in a pressure plate to which a wafer is to be attached; attaching a wafer, including a material same in amount as a desired polishing process amount and different in refractive index from a polishing cloth is attached to a surface of a transparent material relative to a wavelength of a laser beam, to a polishing surface of a pressure plate so as to shield a through-hole of the pressure plate for detecting a process amount; irradiating a laser beam onto said wafer for detecting through said through-hole during polishing; and polishing while measuring the reflection from the wafer with a light amount meter such as a solar cell, so that there is no need to measure the wafer thickness every few minutes while interrupting polishing, thereby providing a wafer polishing method capable of controlling the wafer process amount precisely with saving labor.

Hereinafter, using an embodiment, the present invention will be described in detail. An embodiment of the present invention is shown in the drawings.

At a polishing surface of a through-hole 2 provided in a pressure plate 1, a process amount detecting wafer 3, which is attached with a material 9, such as polysilicon, same in amount as a polishing process amount and different in refractive index from a polishing cloth, for example, on a glass surface allowing a He-Ne laser beam to pass, is attached so as to shield the through-hole 2; a laser beam 5 generated from a laser beam generating device 4, such as a He-Ne laser device, is irradiated onto the process amount detecting wafer 3 through the through-hole 2; and a wafer 7 is polished while detecting the reflected light by a light amount meter 6, such as a solar cell 6. During polishing, if a desired process amount of polishing is not carried out, the laser beam 5 which has reached the process amount detecting wafer 3 is reflected by the material 9, such as polysilicon,

which is attached to the surface of the detecting wafer 3; however, as polishing progresses further and upon removal of the material 9 such as polysilicon on the surface of the detecting wafer 3, the laser beam 5 is reflected by a polishing cloth 8. Since the polishing cloth 8 differs in refractive index from the material 9, such as polysilicon, on the detecting wafer surface, a difference is produced in the amount of light detected by the light amount meter, such as a solar cell, for detecting the amount of reflected light, which indicates that the polishing amount has reached a desired amount, so that polishing is terminated. When use is made of a method of the present invention, there is an advantage of ability to automatically detect a desired polishing amount.

Using a wafer polishing machine of the present invention, when five silicon wafers of 76 mm in diameter and 400 μ m in thickness and a process amount detecting wafer including a glass substrate of 50 mm in diameter and 390 μ m in thickness, on which is attached polysilicon 10 μ m, were polished with a pressure of 100 g/cm², a polishing solution of GRANZOX (product name) and a polishing cloth of SUBA (product name), there was obtained 390 μ m \pm 1 μ m as the thickness of the silicon wafer.

In the above embodiment, although a glass substrate was selected as the process amount detecting wafer and polysilicon was selected as a material different in refractive index from a polishing cloth on the surface of the glass substrate, it is also effective to use other materials in compliance with a material to be polished.

As described above, when use is made of a wafer polishing method according to the present invention, since there is no need to check the polishing amount every few minutes and a desired polishing amount can be detected during polishing, it is extremely labor-saving and enables an accurate amount of polishing.

Brief Description of the Drawings

The drawing illustrates an embodiment of the present invention, in which an appearance during polishing is shown as seen from a direction normal to a cross section of a platen.

- 1: Pressure Plate
- 2: Through-hole
- 3: Process Amount Detecting Wafer

- 4: Laser Beam Generating Device
- 5: Laser Beam
- 6: Light Amount Meter
- 7: Wafer
- 8: Polishing Cloth
- 9: Material Different In Refractive Index From A Polishing
Cloth Formed on Process Amount Detecting Wafer Surface

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⑭ ウエーハポリシング方法

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明 細 書

法。

発明の名称 ウエーハポリシング方法

発明の詳細を説明

特許請求の範囲

本発明は所望のポリシング加工量を除去したか
否かの判定を自動的に検知できるウエーハポリシ
ング方法に関するものである。

(1) ウエーハを加圧板に付着して、ウエーハの片
面をポリシングする片面ポリシング方法において、
厚み方向に貫通穴を設けた加圧板のウエーハ付着
面に、ウエーハの加工量検知用ウエーハを該貫通
穴をしゃへいするように付着し、加圧板に設けた
貫通穴を通して、前記検知用ウエーハにレーザー
光線を照射し、前記検知用ウエーハからの反射を
太陽電池等の光量計で測定しつつ、ポリシング加
工量を制御することを特徴とするウエーハポリシ
ング方法。

従来の片面ポリシング方法を用いた場合、ポリ
シング加工量はポリシング速度を一定と仮定して、
ポリシング時間で推測していたが、ポリシング速
度は研磨布の種類、加圧力およびポリシング液濃
度または種類等により、異なるため、ポリシング
量にバラツキを生じ、数 μm の除去をポリシングで
行なうためには、数分ポリシングする毎に、ウエ
ーハの厚みを測定する必要がある、非常に繁雑で
不正確である。

(2) 前記加工量検知用ウエーハは、前記レーザー
光の波長に対して、透明な材料の表面上に、研磨
布と反射率の異なる物質を所望のウエーハ加工量
と同量付着したものからなることを特徴とする特
許請求の範囲 図1項記載のウエーハポリシング方

本発明は、この欠点を除去し、ウエーハを付着
する加圧板に貫通穴を設け、レーザー光線の波長
に対して透明な材の表面に、所望のポリシング
加工量と同量の研磨布と反射率の異なる材質を付
着したウエーハを加工量検知用として、加圧板の

貫通穴をしゃへいするように加圧板のポリシング面に付着し、ポリシング中に前記貫通穴を通して、レーザー光線を前記検知用ウエーハに照射し、ウエーハからの反射を太陽電池の光量計で測定しつつ、ポリシングすることにより、所望のポリシング量をポリシングしたか否かの判定を自動的に検知することができるため、従来のポリシング方法におけるように、数分毎にポリシングを中断して、ウエーハ厚みを測定する必要がなく、従って、省力的で正確なウエーハ加工量を制御できるウエーハポリシング方法を提供する。

以下実施例を用いて、本発明を詳細に説明する。本発明の一実施例を図に示す。

加圧板1に設けた貫通穴2のポリシング面に、He-Neレーザー光線を通す例えばガラス表面にポリシング加工量と同量の研摩布と反射率の異なる物質9例えばポリシリコンを付着した加工量検知用ウエーハ3を前記貫通穴2をしゃへいするように付着し、貫通穴2を通し、加工量検知用ウエーハ3上にレーザー光線発生装置4例えばHe-Neレ

ーザー装置から発生するレーザー光線5を照射し、反射光を光量計6例えば太陽電池6により検出しつつ、ウエーハ7をポリシングする。ポリシング中、所望の加工量ポリシングされない時は、加工量検知用ウエーハ3に到達したレーザー光線5は、前記検知用ウエーハ3の表面に付着した材質9、例えばポリシリコンで反射するが、ポリシングがさらに進み、検知用ウエーハ3の表面上の材質9、例えばポリシリコンが除去されると、レーザー光線5は研摩布8で反射する。研摩布8は前記検知用ウエーハ表面上の材質9、例えばポリシリコンと反射率が異なるため、反射光量検出用の光量計6例えば太陽電池で検出される光量に差が生じ、ポリシング量が所望の量になったことを示し、ポリシングを終了する。本発明の方法を用いるとポリシング中に、所望のポリシング量を自動的に検出できる利点がある。

本発明のウエーハポリシング装置を用いて、直径76mm厚さ400μmのシリコンウエーハ5枚と直径50mmで厚さ390μmのガラス基板の上に、ポリ

シリコン10μmを付着させた加工量検知用ウエーハを圧力100g/cm²、研摩液グランゾックス(商品名)、研摩布としてスバ(商品名)でポリシングしたところ、シリコンウエーハの厚さ390μm±1μmが得られた。

以上の実施例において、加工量検知用ウエーハとして、ガラス基板を選び、ガラス基板表面上の研摩布と反射率の異なる材質としてポリシリコンを選んだが、ポリシングされる材質に合わせて、他の材料を用いても有効である。

以上述べたように、本発明によるウエーハポリシング方法を用いると、ポリシング量を数分毎にチェックする必要がなく、ポリシング中に所望のポリシング量を検出できるため、非常に省力的で正確な量のポリシングが可能となる。

図面の簡単な説明

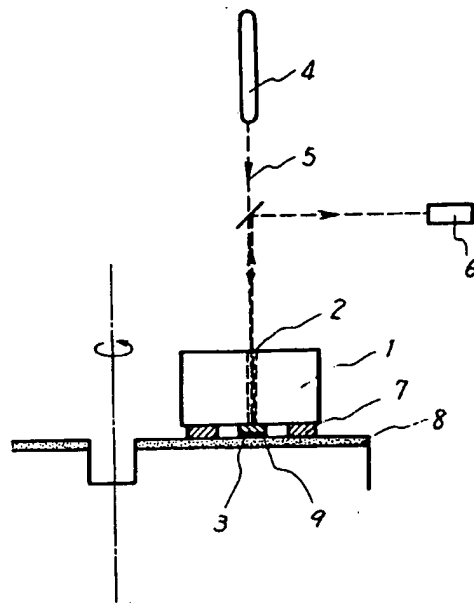
図は、本発明の一実施例を示すもので、ポリシング中の様子を定板の断面に垂直方向から見た状態を示す。

- 1.加圧板 2.貫通穴 3.加工量検知用ウエーハ
- 4.レーザー光線発生装置 5.レーザー光線
- 6.光量計 7.ウエーハ 8.研摩布 9.加工量検知用ウエーハ表面

に形成した研摩布と反射率の異なる物質。

内原 研

内原 研



PATENT ABSTRACTS OF JAPAN

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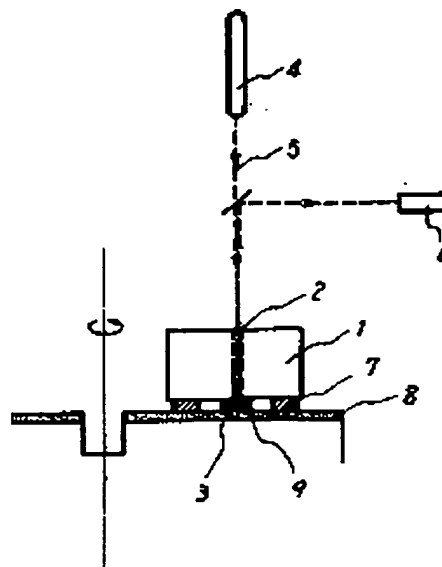
(54) PROCESS OF POLISHING WAFER

(57)Abstract:

PURPOSE: To enable to detect polishing amount of each wafer even in the process of polishing operation by a method wherein, when multiple wafers are stuck on a pressurizing plate to polish one side of a wafer, a hole is pierced through the thickness direction of the pressurizing plate undersurface of which is blocked by a wafer for detecting work already performed to detect the amount of reflected rays from the wafer for detection by means of irradiating the hole with laser beams.

CONSTITUTION: Multiple silicon wafers 7 are stuck on the undersurface of pressurizing plate 1 with a pierced hole 2 at the central part thereof and the undersurface of the pierced hole 2 is blocked by a wafer 3 for detecting work already performed. A polishing cloth 8 with the same thickness as that of the polished work done and multiple crystal silicon with different reflecting power are stuck on the surface such as glass passing He-Ne laser beams on the wafer 3. In such a constitution, laser beams 5 from a laser beam generator 4 are irradiated on the wafer 3 through the holes 2 to polish wafers 7

while the reflected rays are being detected by a light quantity meter such as a solar cell. Through these procedures, the wafer 3 is extinguished and the finishing of the polishing operation is judged when the polishing cloth 8 is left alone.



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